

## REMARKS

In the Official Action of March 27, 2006, the Examiner has found Applicant's previously presented remarks directed toward claims 1-31 to be persuasive. In view of these remarks, the Examiner has withdrawn the rejections to these claims. In view of a new reference to Sun et al. (US Patent No. 6,731,799) The Examiner has rejected claims 1-2,, 4, 6-7, 11-12,14,24,26 and 30-31 under 35 U.S.C §103(a)Furthermore, claims 18-22 are rejected under 35 U.S.C §112 as being indefinite for failing to particularly point our and distinctly claims the subject matter which Applicant regards as the invention. Applicant submits that the present communication is fully responsive to the Official Action of March 27, 2006 and places the present application in condition for allowance.

### Rejections Pursuant to 35 U.S.C. §112

In response to the rejection under 35 U.S.C. §112, Applicant respectfully submits that the claims 18-22 are in condition for allowance as drafted. Regarding the term "measures of confidence", Applicant draws the Examiner's attention to pages 14-15, wherein the term "measures of confidence" is recited. Summarized briefly, a measures of confidence can be taken as one or as a composition of various structural aspects. These structural aspects may include the Magnitude of pheromone track, the Average objective function value across the structure, the size of structure or the variance of merged segments. These measures of confidence may be associated with each of the extracted features of Claim 1. In view of this, Applicant believes that the term "measures of confidence", as recited in claims 18-22 is sufficiently defined in the present invention. Furthermore, Applicant submits that claims 18-22 recite the appropriate antecedent basis for each element. In view of this, Applicant requests that the Examiner withdraw the rejection to claims 18-22 under 35 U.S.C. §112.

### Rejections Pursuant to 35 U.S.C. §103(a)

The Examiner has rejected claim 1-2, 4, 6-7,11-12,14,24,26 and 30-31 under 35 U.S.C §103(a) as being unpatentable over Ishisaka in view of Sun. The Examiner has further rejected claims 3, 5, 8-10, 15-17, 23, 25 and 27-29 as being unpatentable over Ishisaka in view of Sun

and further in view of Ross. Of these rejected claims, claims 1, 30 and 31 are presently independent. Applicants respectfully traverse the Examiner's rejections on the basis that the cited art fails to teach or suggest each element of the presently pending claims.

#### Summary of Ishisaka

As recited in previous Responses, Ishisaka recites a method for detecting the *boundary of a single object* using a pixel by pixel analysis. This pixel by pixel analysis includes the conversion of pixel data into a binary representation. This binary representation results in the identification of pixels on a boundary pixels located on an interior of an object. Under Ishisaka, boundary pixels are first evaluated in a chain direction. This chain direction is based upon the direction from which the chain has proceeded, with reference to the neighboring pixel information. As noted by the Examiner in the Office Action of March 27, 2006 there is no electronic pheromone associated with any of these pixels. Under Ishisaka, an outline of the boundary of the object of interest is eventually determined.

#### Summary of Sun

Sun recites a method of background extraction using a pixel by pixel analysis wherein data from an image frame is allocated among three suitable groups. These groups include a group which includes data derived from a motion boundary, data derived from normalized background data and a final group which includes all non-accounted for data. As recited in Sun, data from these groups is used to generate an initial estimate for the object boundary within the image frame. An iterative process is then completed wherein the object boundary is adjusted such that a final representation of the object boundary is established.

#### Arguments

Applicant respectfully submits amended independent claims 1, 30 and 31 wherein these claims have been amended to note that the plurality of agents may start from one or more different starting points. Additionally, amended independent claims 1, 30 and 31 recite the association of the electronic pheromone with one or more of the plurality of agents. Applicant believes that each of these amendments is fully supported by the current

specification. Applicant respectfully submits that the cited references, alone or in combination, fail to teach all elements in the current claims and therefore fail to render the present invention obvious.

As recited in presently pending independent claims 1, 30 and 31, a plurality of agents may be used in extracting features from a cellular image, wherein these multiple agents may have one or more starting points. Applicant submits that the cited art fails to teach or suggest the *multiple starting points* of the present invention because the cited art solely concerns boundary identification and classification of pixels as inside or outside of the identified boundary. This identification uses a single starting point and generally proceeds in a clockwise or counterclockwise direction. Applicant cites column 12, lines 33-35 of Sun, which notes the single starting point inherent in all iterative pixel analysis.

Applicant further cites column 12, lines 65-67 of Sun which illustrate the counterclockwise or clockwise direction used in all boundary propagation

In contrast, Applicant draws the Examiner's attention to page 7 of the current specification, wherein the use of multiple agents to extract a feature such as an extrema ridge is taught. The use of multiple agents, as set forth on page 7 reads in part:

“The idea is to distribute a number of agents in the 2D or 3D image and let each agent move along an extrema ridge while emitting pheromone as long as the ridge fulfils the criteria encoded in the agent. Agents which are deployed at a point where there is no extrema ridge, or where the ridge is poorly defined, will be terminated shortly or immediately after their deployment, whereas agents deployed at points on a well-defined ridge will be able to follow this ridge for a while before being terminated.”

As noted in the cited text, the use of one or more starting points provides for the tracking of electronic pheromones associated with one or more of the plurality of agents. Applicant submits that the cited references, either alone or in combination, fail to teach or suggest the multiple agents of the present invention. Applicant further submits that the tracking of pheromones associated with one or more agents, as set forth in the present invention, is not

taught by the cited references. In view of this, Applicant submits that the cited art fails to teach or suggest each element of the pending independent claims and therefore fails to render these claims obvious.

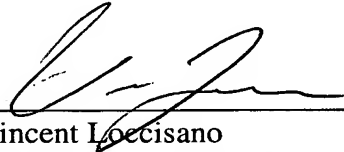
Furthermore, as each agent progresses through the cellular image, each agent may leave its own trail by updating the pheromone value of the cells that it has passed through. The locations of these multiple agents are followed as these agents follow different structures creating the aforementioned “trail”. For example, if multiple agents saw the same cell, there is a higher likelihood that this cell is on a real structure. Such an update and resulting “trail” is clearly taught by the presently amended independent claims and fully supported by the current specification. The Examiner states in the present Office Action that such updating is not taught or suggested by the Ishiasaka reference. The Examiner does assert that this updating is disclosed by Sun at column 13, lines 1-42. Applicant respectfully disagrees and submits that Sun fails to teach or suggest pheromone updating in accordance with the present invention. As set forth in pending independent claims 1, 30 and 31, the updating of an electronic pheromone value is repeated and associated with one or more of the plurality of initial agents. In contrast, the Sun reference concerns boundary propagation on a pixel by pixel level. Under such an arrangement, as recited at column 13 line 30 of Sun, a pixel “is tested and the boundary propagated outward, inward or not at all.” In contrast, the use of an electronic pheromone associated with one or more of the agents to provide a “trail” is not render obvious by the cited art.

Applicant respectfully asserts that the method, computer system, and computer program product as currently claimed are not recited by the Ishisaka and Sun references. In view of this, Applicant believes that presently pending claims 1, 30 and 31 are in condition for allowance as drafted. Furthermore, Applicant submits that those dependent claims which rely on independent claim 1 for support are further in condition by their very nature as dependent claims. In view of this, Applicant respectfully submits that the rejection of claims 3, 5, 8-10, 15-17, 23, 25 and 27-29 in view of Ishisaka, Sun and Ross (U.S. Patent No. 6,608,628) has been overcome. Furthermore, in view of the remarks presented herein, Applicant submits that the Examiner rejection of claims 18-22 in view of Ishisaka and Sun as applied to De Yong (U.S. Patent No. 6,577,757) is overcome. Applicant therefore urges the

Examiner to withdraw the rejection to the presently pending claims, and issue a timely Notice of Allowance.

The Commissioner is hereby authorized to charge or credit any deficiency or overpayment to Deposit Account N°. 19-0615. This sheet is filed in duplicate.

Respectfully submitted,

  
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